

Remarks

This amendment is in response to the final Office Action dated May 3, 2004 and is being filed concurrently with a Request for Continued Examination (RCE) under 37 C.F.R. 1.114.

The Office Action rejected claims 1, 4, 5, 7, 8, 18 and 25-28 under 35 U.S.C. §103(a) as being obvious over applicants admitted prior art (AAPA) in view of U.S. Patent No. 5,247,516 (Bernstein et al.). Claim 6 was rejected under 35 U.S.C. §103(a) as being obvious over AAPA in view of Bernstein et al., and further in view of U.S. Patent No. 4,914,650 (Sriram). Claims 3 and 20 were rejected under 35 U.S.C. §103(a) as being obvious over AAPA in view of Bernstein et al., and further in view of U.S. Patent No. 5,400,044 (Thomas). Claims 9-11, 13, 21 and 23-24 were rejected under 35 U.S.C. §103(a) as being obvious over AAPA in view of U.S. Patent No. 6,510,162 (Fijolek et al.) and Bernstein et al. Claim 12 was rejected under 35 U.S.C. §103(a) as being obvious over AAPA in view of Fijolek et al. and Bernstein et al. and further in view of U.S. Patent No. 5,295,140 (Crisler et al.). Claim 22 was rejected under 35 U.S.C. §103(a) as being obvious over AAPA in view of Bernstein et al. and further in view of Crisler et al. Claims 1, 18 and 28 were rejected under 35 U.S.C. §103(a) as being obvious over Fijolek et al. in view of Bernstein et al.

In response, Applicant has amended claims 1, 9, 18 and 28. Claims 2, 14-17 and 19 were cancelled in the prior Amendment dated October 27, 2003 (the "Prior Amendment"). Claims 29-35 were cancelled without disclaimer or prejudice in a Response to Election/Restriction Requirement under 35 U.S.C. 121 filed June 3, 2003. Claims 1, 3-13, 18 and 20-28 are currently pending and remain for consideration.

The current Office Action essentially repeats the rejections set forth in the earlier Office Action dated July 3, 2003, but with withdrawal of reliance on the Hou et al. reference. For the sake of brevity, Applicant will not reproduce herein its arguments from the Prior Amendment. However, Applicant hereby incorporates herein all of the arguments from the Prior Amendment as if fully set forth herein. In order to more efficiently advance this application to issuance, Applicant will focus on the current claim amendments and the distinctions over the prior art. Since the Office Action's response to Applicant's prior arguments focuses mainly on the Bernstein et al. reference, Applicant's will also focus these new arguments on that reference.

The present invention is directed to a technique for reducing jitter in a bi-directional cable-access system. One of the problems with upstream channel communications in a cable-access system is illustrated in Fig. 4 of the present application and described in the specification at page 7. As seen from Fig. 4 and the accompanying description, jitter occurs as a result of shifting time slots within a nominal grant interval. As a result of this shift, voice packets are not received at their expected time, which leads to so-called jitter, or packet delay variation, and an accompanying degradation of service. The present invention solves this problem by establishing jitter windows within the voice region of a transmission frame so as to maintain the packet delay within an acceptable tolerance. This aspect of the invention is described, for example, in conjunction with Fig. 2A at page 13 of the specification. As can be seen, the establishment of appropriate non-overlapping jitter windows which collectively cover the entire voice regions, results in limiting the jitter to the duration of the jitter window. Thus, even if there is shifting of

time slots, such shifting will remain within an assigned jitter window, and as such, the packet delay variation is limited by the size of the jitter window.

Each of the jitter windows in accordance with the claimed invention comprises a plurality of time slots for carrying voice packets. When the time slot carrying a particular call shifts to a different time slot, jitter is limited by shifting to a time slot within the previously assigned jitter window.

Claim 1 has been amended to more particularly point out and claim this aspect of the invention. For example, claim 1 now contains the limitations of a “each of said at least two jitter windows comprising a plurality of time slots”, and “wherein said jitter windows are established such that packet delay variation of calls being transmitted within each of said jitter windows is maintained within an acceptable tolerance when voice packets associated with a call are shifted between time slots”. Thus, as amended, claim 1 now clearly claims jitter windows which are made up of time slots, and also includes limitations directed to maintaining jitter within acceptable tolerances when voice calls are shifted between time slots.

Bernstein et al. discloses a technique for organizing a data packet which appears at first instance to be similar to the present invention, but Applicant will herein show why Bernstein et al. is different from the present invention. First, with reference to Fig. 5 (and the accompanying description at col. 14, lines 23 – 59) of Bernstein et al., it is seen that a frame in accordance with Bernstein et al. includes a payload 93 which is made up of three traffic component slots (T-slots 96, 97, 98). These T-slots are grouped according to traffic component type (e.g., voice or data). As such, these T-slots may be compared to the voice region and data regions of the frame in accordance with the present invention

(see Fig. 2A of present invention). Next, each of the T-slots of Bernstein et al. are further divided into channels (99, 100, 101). Each channel of a T-slot is allocated to a particular subscriber connection (e.g., a call). Thus, these channels may be compared to the time slots of the present invention. However, what Bernstein et al. is lacking is the intermediate grouping of jitter windows in accordance with the present invention.

Consider the following table showing a possible correlation of the Bernstein et al. frame and a frame in accordance with the present invention:

PRESENT INVENTION	BERNSTEIN
Voice and Data Regions	T-Slots
Jitter Windows	<i>Missing</i>
Time slots	Channels

As a result of the amendment to claim 1 (adding the limitation of “each of said at least two jitter windows comprising a plurality of time slots”), claim 1 now clearly and distinctly claims this three part frame hierarchy.

The fact that Bernstein et al is missing the intermediate grouping (i.e., jitter window) is not surprising because Bernstein et al. has no need for a jitter window. As discussed above, the jitter window in accordance with the present invention is used so that when a call connection is shifted between time slots, such shifting will remain within an assigned jitter window, and as such, the packet delay variation is limited by the size of the jitter window. Thus, the jitter window is used to reduce the jitter problem when a call connection is shifted from one time slot to another.

Bernstein et al. does not need to address this time slot shifting problem because the channel assignments are assigned on a per call connection basis and are dedicated for the entire duration of the call connection. (Bernstein et al. col. 4, lines 54-57, 63-68; and col. 14, lines 41-45).¹ Since channels are assigned on a per call connection for the entire duration of the call connection, there is no shifting to different channels and therefore the problem of jitter does not arise and is therefore not addressed.

Each of the jitter windows in accordance with the claimed invention comprises a plurality of time slots for carrying voice packets. When the time slot carrying a particular call shifts to a different time slot, jitter is limited by shifting to a time slot within the previously assigned jitter window. This aspect of the invention has also been addressed by the addition of the claim limitation of “when voice packets associated with a call are shifted between time slots”.

For the reasons discussed above, Bernstein et al. does not disclose the jitter window as claimed in amended claim 1. Claim 1 is therefore allowable over Bernstein et al.

Independent claims 18 and 28 have been amended in a manner similar to the amendment to claim 1 and are allowable for the same reasons as discussed above in connection with claim 1.

Independent claim 9 is directed to a method for allocating a new upstream channel in accordance with the present invention. Claim 9 has been amended to add the limitation of “one or more jitter windows comprising a plurality of time slots for carrying voice packets” and so claim 9 also now clearly and distinctly claims the three part frame

¹ It is noted that at Col. 14, lines 46-59, Bernstein et al. discloses the possibility of reconfiguring the entire frame after each burst, but then goes on to discuss the inefficiency and overhead problems of such an alternative and provides no further discussion of the problems or solutions surrounding this alternative.

hierarchy discussed above in connection with claim 1 and is allowable for the same reasons. Further, claim 9 contains existing limitations directed to the time slot shifting problem which, as discussed above, is missing from Bernstein et al. As such, claim 9 is also allowable over the cited art for the reasons discussed above. With respect to Fijolek et al., Applicant repeats the arguments made in the Prior Amendment. For these reasons, claim 9 is allowable over the cited art.

For the reasons described above, all independent claims 1, 9, 18 and 28 are allowable over the cited art. All remaining claims are dependent upon an allowable independent claim and are therefore also allowable. Further, the dependent claims add additional allowable subject matter for the reasons discussed in the Prior Amendment which are repeated herein.

For the foregoing reasons, the cited art does not render the pending claims obvious.

No new matter has been added by this amendment.

Reconsideration and allowance of all pending claims is respectfully requested.

Respectfully submitted,



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